Radioactive Tank Waste

Goal

Tank waste from both single-shell tanks and double-shell tanks will be retrieved for immobilization. Waste will be separated into high-level and low-activity fractions. Low-activity waste will be immobilized and disposed of onsite. High-level waste will be immobilized for disposal in an offsite federal repository.

Fiscal Year 1998 Objectives

Key objectives for the year included:

- selection of a privatization contractor
- closure of all Unreviewed Safety Questions for double-shell and single-shell tanks
- initiation of operation of Tank Farm ventilation upgrades
- initiation of operation of the Cross-Site Transfer Line
- initiation of sluicing retrieval of Tank C-106.

In February 1998, tank farm operations workers achieved one million hours without a lost workday.

There are 204,000 cubic meters (54 million gallons) of radioactive high-level waste stored in underground tanks on the Hanford Site. The waste includes various mixtures of chemicals, salts, complex organic compounds, and other materials, and is found in several forms, from liquids and sludges to hardened salts.

The waste is stored in 149 single-shell tanks and 28 double-shell tanks arranged in groupings known as tank farms. The single-shell tanks are made of reinforced concrete with a single steel liner, and nearly half are suspected of having leaked in the past, though none are thought to be leaking now. The double-shell tanks feature a sturdier design with two steel liners. No leakage has been detected from double-shell tanks.

The composition and consistency of the waste, as well as the urgent need to prevent further leakage into the surrounding soil, pose many challenges to cleanup efforts.

RL is working with the Project Hanford Management Contractor and the privatization contractor to safely retrieve, immobilize, and dispose of tank waste stored at Hanford. In fiscal year 1998, significant progress was made in two areas: reducing risks to workers, the public and the environment, and applying innovative technology.

Reduced Risks: Tank Waste Solutions Closer to Reality

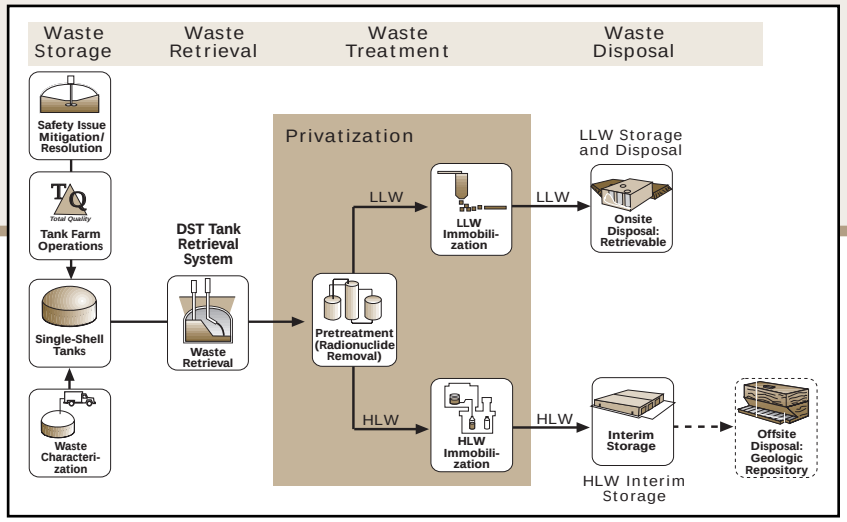
In August 1998, DOE signed a historic agreement expected to produce a long-term solution for immobilization of Hanford's high-level radioactive tank waste. The $10.4 billion "privatization" agreement with BNFL Inc., the U.S. subsidiary of British Nuclear Fuels Limited, calls for the company and its team of subcontractors to design, build, and operate a facility where a large amount of Hanford tank waste—approximately 10 percent of the mass and 25 percent of the radioactivity—will be treated and immobilized. BNFL Inc. will own the facility and be paid a fixed-unit price for the waste that is processed.

By April 2000, BNFL Inc. will complete approximately 30 percent of facility design, submit regulatory permits, obtain financing, and be prepared to start construction. By August 2000, DOE plans to authorize BNFL Inc. to proceed with facility construction and operation.

The agreement, the first of its kind, is also the largest and most complex cleanup contract ever signed by DOE. And while it does not immediately reduce risks, the pact is expected to lead to resolution of one of the site's most hazardous problems and represents a significant milestone in risk reduction efforts.

During the year, Hanford workers tackled the most complex and extensive tank upgrades ever. The improvements have resulted in a safer, more compliant system for ventilating the hottest waste tanks.

Another accomplishment came just after the end of the fiscal year when DOE Secretary Bill Richardson announced an agreement with the state of Washington that outlines achievable timetables for pumping radioactive liquid waste from 149 single-shell tanks into double-shell tanks. Prior to the agreement, the state had threatened to sue over missed pumping deadlines.



Under the privatization agreement with BNFL Inc., waste will be pretreated and immobilized. Low-activity waste will be disposed of in an onsite facility, while high-level waste will be placed in interim storage until an offsite geologic repository is established.

Progress also was realized with the new Cross-Site Transfer Line, which replaces an antiquated system with two new, environmentally compliant lines and serves as a vital link for moving tank wastes from single-shell tanks in the 200 West Area into double-shell tanks in the 200 East Area. The 10-kilometer (6.2-mile) system features two separate lines—one for liquids, the other for slurries—that will transport wastes in a manner that is safe for workers and the environment. In May 1998, RL approved operational readiness plans for the line that will be used for moving liquid waste. The first transfers are expected to occur in fiscal year 1999.

Retrieving waste from the single-shell tank C-106 is closer to reality following the construction of a waste removal system in June. C-106 is one of Hanford's high priority safety issues because decaying strontium-90 in the tank's 870,644 liters (230,000 gallons) of high-level radioactive waste causes the tank to heat up. High temperatures could damage the tank's structure and create a leak. Retrieval of the waste and transfer of the material to a double-shell tank is scheduled to start in early fiscal year 1999. The retrieval also will serve as a demonstration project that will provide useful information for future waste removal activities.

Also in fiscal year 1998, the following activities were accomplished:

- The Tank Waste Remediation System (TWRS) had a 6.3 percent favorable cost variance and completed 98 percent of all incentivized work scope.
- The number of operating Standard Hydrogen Monitoring Systems on tanks was increased from 27 to 43.
- Documentation for closing the Organic Safety Unreviewed Safety Question and Safety Issue was submitted to DOE-Headquarters. Closure will reduce the number of tanks on the safety issue watch list from 38 to 27.
- Substantial progress was made on establishing an Integrated Safety Management System for the TWRS. Integrated safety management, now mandated throughout the DOE complex, seeks to seamlessly integrate safe practices into all levels of work.

Innovative Technology Applications: New Sampling, Assessment Methods

During 1998, advances also were made in applying innovative technology to tanks-related work. Five technologies that improved site capabilities in areas such as sampling, modeling, and inspection were deployed:

- The Laser Ablation/Mass Spectrometer System is a faster, more reliable waste sample evaluation tool.
- The Hanford Tank Waste Operations Simulator is a modeling technology that provides waste storage volume projections.
- The Annulus Inspection Ultrasonic Crawler Robot assesses tank wall integrity, satisfying a regulatory requirement.
- The Remote Ultrasonic Tank Inspection System supports tank integrity assessments and satisfies a regulatory requirement.
- 3-D Digital Camera Photogrammetry helps determine the location of equipment in high-radiation environments.

Also, four vendor demonstrations of retrieval equipment led to the awarding of two competitive performance-based contracts for defining complete systems to remove hardened waste from the bottom of tank C-106.

Accomplishments

- A $10.4 billion contract was awarded to BNFL Inc. that allows plans for privatized treatment and immobilization of radioactive tank wastes to proceed.
- All Organic Complexant and Flammable Gas Unreviewed Safety Questions for double-shell and single-shell tanks were closed (only the 101-SY crust growth Unreviewed Safety Question remains).
- An upgraded tank ventilation system went into operation, providing a safer, compliant system to ventilate the hottest waste tanks.
- The Cross-Site Transfer Line, which will provide for safe transfer of wastes from single-shell to double-shell tanks, and from the tanks to treatment facilities, was readied for operation.
- The project for sluicing high-heat waste from single-shell tank C-106 was completed. Sluicing will begin in November 1998.

Near-Term Challenge

A crust of waste material that formed in tank 101-SY is rising slowly and, as early as November 1999, could reach beyond the tank's double containment height (the point where the two walls of a double-shell tank intersect and become a single wall). The rise is believed to be caused by gas percolation in the crust. Though not currently a safety concern, the matter is being studied and a mitigation strategy will be developed.